

Forest Site Preparation (Acre) 490

DEFINITION

Treating areas to improve site conditions for establishing a forest.

PURPOSES

- Encourage natural regeneration of timber species.
- Permit artificial establishment of woody plants.

CONDITIONS WHERE PRACTICE APPLIES

On all lands where establishment of woody plants is desired.

CRITERIA

General Criteria Applicable To All Purposes

The method, intensity, and timing of site preparation will match the limitations of the site, equipment, and the requirements of the desired woody species.

Select vegetation adapted to the site that will accomplish the desired purpose. Preference shall be given to native species in order to: reduce the introduction of invasive plant species; provide management of existing invasive species; and minimize the economic, ecological, and human health impacts that invasive species may cause. If native plant materials are not adaptable or proven effective for the planned use, then non-native species may be used. Refer to the Michigan NRCS Field Office Technical Guide, Section I, Invasive Plant Species for plant materials identified as invasive species.

Soil Site Index (average height of dominant and co-dominant trees at age 50 on a given soil) may be used to determine the relative timber and/or pulpwood productivity when selecting tree species to plant or regenerate on the site. (Refer to Table 1 - Site Classes for Michigan Tree Species in Section II-F of the Michigan NRCS Field Office Technical Guide for further details.)

An appropriate site preparation method will be chosen to protect any desirable vegetation in understocked areas.

Remaining slash and debris shall not create habitat for or harbor harmful levels of pests.

Remaining slash and debris shall not hinder needed equipment operations or create undue fire hazard.

Accelerated erosion and/or runoff from site preparation will be controlled by supporting practices. Refer to the following Michigan NRCS Standards for additional information:

- Filter Strip (393A)
- Diversion (362)
- Streambank Protection (580)
- Critical Area Planting (342)
- Forest Harvest Trails and Landings (655)
- Grade Stabilization Structure (410)
- Riparian Forest Buffer (391)
- Tree/Shrub Establishment (612)

All chemicals will be applied in accordance with label guidelines. Refer to Michigan NRCS Standard Pest Management (595). Chemical containers will be disposed of in a safe, approved manner.

Comply with applicable laws and regulations (see Michigan NRCS Field Office Technical Guide, Section I, Subsection Laws) and Michigan Best Management Practices (BMPs) outlined in the handbook entitled: Water Quality Management Practices on Forest Land, published by the Michigan Department of Natural Resources, Forest Management Division.

Criteria Applicable To Natural Regeneration Of Timber Species

Aspen

Sites may be selected for regenerating aspen on basis of soil type, site index, existing tree species, market, and benefits to wildlife.

Locations with a soil site index of 60 or greater for aspen are generally suited for regeneration of that species. (Refer to Table 1 - Site Classes for Michigan Tree Species in Section II-F of the Michigan NRCS Field Office Technical Guide.)

Parent stands should have a minimum of 50 mature aspen trees per acre (or 20 square feet of basal area

per acre) prior to harvesting in order to ensure adequate sucker regeneration after the harvest.

Cutting of all woody stems down to 2 inches DBH (Diameter Breast Height = 4 1/2 feet above the ground surface) will promote heating of the soil to stimulate maximum suckering.

Prescribed burning and/or roller chopping may damage parent roots and slow sucker growth.

Other Species

Sites for regeneration of other species may be selected on the basis of soil type, soil site index, existing tree species, markets, and benefits to wildlife.

Generally, locations to be considered for hardwood timber production will have a soil site index of 60 (considered as medium) or greater for those species to be managed. Exceptions to this are Cottonwood-86 and Silver Maple-76.

Generally, locations considered for timber production of red pine, white pine, jack pine, tamarack, and white spruce will have a soil site index of 50 (considered as medium) or greater for these species. Locations considered for timber production of white cedar will have a soil site index of 27 or greater.

Kill any unwanted trees after logging by cutting or chemically treating them.

Protect growing seedlings by using shade from remaining trees to retain site moisture.

Leave 60-80 percent shade in the remaining overstory canopy for seedlings of shade-tolerant species (sugar maple, red maple, hickory, beech, white spruce, northern white cedar, balsam fir, basswood, hemlock, and black cherry).

Leave 40-60 percent shade in the remaining overstory canopy for seedlings species of intermediate shade tolerance (white ash, black ash, white oak, red oak, paper birch, American elm, yellow birch, and white pine).

When regenerating white pine and light seeded hardwood species (birch and elm), wherever practical, dispose of heavy slash and prepare a seedbed by mixing humus and mineral soil over at least 60 percent of the area.

Shade-intolerant species seed (red pine, yellow poplar, jack pine, and tamarack) germinates and grows best in full sunlight with adequate moisture. Seedbeds for these species may be created by clearcutting, prescribed burning, use of herbicides, or a combination of these methods depending on the site and existing vegetation.

Leave at least 4 and up to 20 well-distributed seed trees per acre of the desired species in the canopy to provide an adequate seed source. Note: Shallow-rooted species (spruces, red and sugar maple, and black and green ash) may be subject to wind-throw on exposed sites.

The use of prescribed burning for site preparation in natural regeneration of conifers on privately owned small forest tracts should be evaluated carefully. The uncertainty of and infrequency of seed years, potential landowner liability, risk of wildfire, and the superior success of hand and machine planting are factors that should be evaluated before considering a prescribed burn. Consult Michigan and National NRCS policies on prescribed burning and refer to Michigan NRCS Standard Prescribed Burning (338) for further details.

Criteria Applicable To Artificial Establishment Of Woody Species

Site Preparation For Planting On Sites With Woody/Brushy Competition

- Eliminate all competing woody and herbaceous and grassy vegetation by girdling, cutting, or chemical means.
- Reduce heavy slash concentrations only to the extent necessary to facilitate planting.
- Apply herbicides one season prior to planting for best results. The need for a summer or fall follow-up application of herbicide prior to the next year's growing season for the first three years after planting should be evaluated.

Site Preparation For Planting In Open (Non-Brushy) Fields

- Mechanical scalping may be used to prepare a seedling bed in either spring or fall on sands, sandy loams, and loamy sands with light to moderate grassy and/or herbaceous competition.
- The seedling bed may be prepared by hand scalping an 18 inch diameter circle free of sod,

by shallow furrowing with a single or double bottom plow (less than 4 inches deep) or by use of a mechanical scalper attached to or separate from the planting machine.

- For spring planting of seedlings, kill existing herbaceous and grassy vegetation with a fall application of herbicide by: spot spraying individual 3 foot square areas; spraying a continuous band at least 3 feet wide in the rows leaving a sod strip in between; or applying herbicide to the entire area to be planted. Note: Spring application of herbicides for spring planting in heavy weed or grass competition without additional scalping may not provide adequate weed control. Note: The use of fabric weed barriers or natural or synthetic mulches may be an effective alternative to scalping and/or the use of chemical herbicides. (See Michigan NRCS Design Sheet 612 - Weed Control for Tree and Shrub Establishment.)
- In all cases, the need for a summer or fall follow-up herbicide treatment the first three growing seasons after planting should be evaluated.
- For fall plantings (only recommended on well and moderately well drained sands, loamy sands, and sandy loams due to frost-heave potential), apply herbicides in spring to assure a weed-free planting bed. The need for a spring or fall application of herbicide after the first three growing seasons after planting should be evaluated. (See Michigan NRCS Standard Tree/Shrub Establishment (612) and Michigan NRCS Design Sheet 612 - Weed Control for Tree/Shrub Establishment for details and alternative weed control methods.)

Refer to Extension Bulletins: E-2592 (1995) Pesticides for Use in Forest and Seed Orchards in the North Central Region; E-2594 (1995) Pesticides for Use in Christmas Tree Production in the North Central Region; and North Central Regional Extension Publication 251 (1997), Effective Herbicide Use In Christmas Tree Plantations and manufacturers' labels for most recent herbicide recommendations.

Consult the Michigan NRCS Field Office Technical Guide, Section II, Soil Pesticide Interaction Ratings For Water Quality to choose herbicides, review leaching and runoff potential, persistence, and toxicity ratings of chemical formulations. Use the safest available herbicide. Pesticides used

improperly can be injurious to man, animals, and plants.

Follow all label instructions for herbicides and use in accordance with all applicable local, state, and federal laws.

Site Preparation For Natural Or Direct Seeding

- Successful natural seeding requires that seeds of the desired species must be already present on the site (seed bank) or be capable of dispersing and establishing onto the site from viable seed producing trees or shrubs (seed wall).
- The seeding site should be no greater than 200 feet from the surrounding seed wall to allow for adequate dispersal by wind, water, or animals.
- Select native species for direct seeding whenever possible.
- Prepare the seeding bed by exposing mineral soil through mechanical means such as plowing, disking, dozing, or prescribed burning. (Refer to Michigan NRCS Standard Prescribed Burning (338) application of approved herbicides, or a combination of these means prior to the dormant season. Wherever possible, mix humus in with the mineral soil to prepare a seedbed.
- Plant at least 3,000 seeds per acre of heavy seeded species (oaks, walnut, hickory, and butternut) and 4,500 seeds per acre if broadcasting light seeded species (maples, cottonwood, ashes, basswood, pines, black cherry, and spruces).
- Depth of planting for heavy seeded species will be approximately 2 times the seed diameter. Plant all species at 2 inches or more if seed predation and/or low soil moisture are anticipated. Light seeded species may be sown directly on the surface of the soil. If possible, seed that is broadcast will be disked in and cultipacked or rolled.

The following chart shows row spacing and seed spacing combinations that will result in about 3,000 seeds per acre:

6 ft. row spacing =	2.4 ft./seed
7 ft. row spacing =	2.0 ft./seed
8 ft. row spacing =	1.8 ft./seed
9 ft. row spacing =	1.6 ft./seed
10 ft. row spacing =	1.5 ft./seed

11 ft. row spacing = 1.3 ft./seed
12 ft. row spacing = 1.2 ft./seed
13 ft. row spacing = 1.1 ft./seed
14 ft. row spacing = 1.0 ft./seed
15 ft. row spacing = 1.0 ft./seed
16 ft. row spacing = 0.9 ft./seed
17 ft. row spacing = 0.8 ft./seed
18 ft. row spacing = 0.8 ft./seed

CONSIDERATIONS

The chosen method should be cost effective and protect cultural resources, wildlife habitat, springs, seeps, wetlands, water bodies, and other unique areas.

The climate, soil type and properties, topography, existing vegetation, planting methods, and the species selected for planting govern the type of site preparation needed.

Promote the planting and regeneration of native species wherever possible.

Cultivation of open fields (disking, plowing, dragging, etc.) prior to planting seedlings or transplants may increase the potential for erosion and cause increased mortality of the planting stock due to a lowering of the available moisture content in the soil, increased exposure of plants to wind and the elements, and an unfavorable change in the microclimate.

PLANS AND SPECIFICATIONS

Specifications for applying this practice will be prepared for each site and recorded using approved specification sheets, job sheets, and narrative statements in the conservation plan, or other acceptable documentation. Plans and specifications will address species; method(s) of site preparation; and the protection required for the seed, seedlings, or cuttings, as well as the protection needed for the site.

Minimum documentation for certification required for this practice includes: map of area to receive site preparation; treatment method and type of equipment used; species planted, seeded, or regenerated; growth data (site index, etc.); and/ or other data supporting selection of species to be planted or regenerated on the site, treatment date (if herbicide(s) are used, a listing of the date), rate, and location of application.

OPERATION AND MAINTENANCE

Operation and maintenance are not applicable to this practice.

REFERENCES

Manager's Handbook For Aspen In The North Central United States, 1975, General Technical Report NC-36, North Central Forest Experiment Station, USDA Forest Service, St. Paul, MN.

Manager's Handbook For Northern Hardwoods In The North Central United States, 1975, General Technical Report NC-36, North Central Forest Experiment Station, USDA Forest Service, St. Paul, MN.

Oak Forests Of The Lake States And Their Management, John Arend and Harold Sholz, 1969, USDA-Forest Service Research Paper NC-31, 1969.

Seeding And Planting In The Practice of Forestry, 1931, First Edition, James W. Toumey, Second Edition, James W. Toumey and Clarence F. Kortstian, John Wiley and Sons.

Seeds Of Woody Plants In The United States, 1974, Ag. Handbook No. 450, USDA Forest Service.

Seeds Of Woody Plants In North America, 1992, James A. Young and Cheryl G. Young, Dioscorides Press.

Silvics Of North America, Vols. 1 and 2, 1990, Handbook 654, USDA Forest Service.

The Practice Of Silviculture, Seventh Edition, 1962, David Martyn Smith, John Wiley and Sons, Inc.

Tree Planting In Michigan, 1997, Douglas O. Lantagne and Melvin R. Koelling, Michigan State University Department of Forestry, Extension Bulletin E-771, East Lansing, MI.

Woody Plant Seed Manual, 1948, Misc. Pub. 654, USDA Forest Service.